CLAIMS

1. In a digital filter for sub-band synthesis, a method of performing an IDCT (Inverse Discrete Cosine Transform) process that generates time domain samples from frequency domain samples using prestored cosine coefficients, comprising:

prestoring only the cosine coefficients that satisfy $\cos(\pi * (i/64))$ for $i = 0$ to 32; and

calculating cosine coefficients for $i = 33$ to 63 using the prestored coefficients by changing a sign of a corresponding symmetrical one of the stored coefficients, respectively.

2. The method of claim 1, further comprising the step of:

generating sixty-four time domain samples (V_i) from thirty-two frequency domain samples (S_k) according to the equation

$$V_i = \sum_{k=0}^{31} \cos((\pi/64)(i+16)(2k+1)) \times S_k$$

for $i = 0$ to 63, using only the prestored cosine coefficients and the calculated cosine coefficients.

3. The method of claim 2, wherein the sequence of time domain samples are from an MPEG compliant audio sub-band.

4. In a digital filter for sub-band synthesis, a method of performing an IDCT (Inverse Discrete Cosine Transform) process that generates time domain samples from frequency

domain samples using prestored cosine coefficients, comprising:

prestoring only the cosine coefficients that satisfy $\cos(\pi * (i/64))$ for $i = 0$ to 63.

5. The method of claim 4, further comprising the step of:

generating sixty-four time domain samples (V_i) from thirty-two frequency domain samples (S_k) according to the equation

$$V_i = \sum_{k=0}^{31} \cos((\pi/64)(i+16)(2k+1)) \times S_k$$

for $i = 0$ to 63, using the prestored cosine coefficients.

6. The method of claim 5, wherein the sequence of time domain samples is from an MPEG compliant audio sub-band.

7. In a digital filter for sub-band synthesis, a method of performing an IDCT (Inverse Discrete Cosine Transform) process that generates time domain samples from frequency domain samples using prestored cosine coefficients, comprising:

prestoring only the cosine coefficients that satisfy $\cos(\pi * (i/64))$ where $i = 0\text{-}32$;

calculating the cosine coefficients for $i = 33\text{-}63$ using the stored coefficients by changing a sign of a corresponding symmetrical one of the stored coefficients, respectively; and

generating sixty-four samples (V_i) from thirty-two sub-band samples (S_k) according to the equation,

$$V_i = \sum_{k=0}^{31} \cos((\pi/64)(i+16)(2k+1)) \times S_k$$

for $i = 0$ to 63, using the prestored cosine coefficients and the calculated cosine coefficients.

8. The method of claim 7, wherein the sequence of time domain samples is from an MPEG compliant audio sub-band.

9. In a digital filter for sub-band synthesis, a method of performing an IDCT (Inverse Discrete Cosine Transform) process that generates time domain samples (V_i) from frequency domain samples (S_k) using prestored cosine coefficients, where i and k are integer values defining columns and rows respectively of a matrix of cosine coefficients, the method comprising:

prestoring the cosine coefficients $C(k-1,i)$ and $C(k-2,i)$ for each column of the matrix;

prestoring an adjustment value $\cos(E(i))$ for each column of the matrix; and

calculating the cosine coefficients for the remaining locations in the matrix using the prestored coefficients and the prestored adjustment values in accordance with the equation

$$C(k,i) = 2 \cos(E(i)) * C(k-1,i) - C(k-2,i).$$

10. The method of claim 9, wherein the adjustment value $\cos(E(i))$ is calculated as $\cos(\pi/64 * (i+16) * 2)$.

11. The method of claim 9, wherein the adjustment value $\cos(E(i))$ is calculated as $\cos(\pi/72 * (2i+19) * 2)$.

12. The method of claim 9, wherein the adjustment value $\cos(E(i))$ is calculated as $\cos(\pi/24 * (2i+7) * 2)$.

13. The method of claim 9, further comprising the step of:

generating sixty-four time domain samples (V_i) from thirty-two frequency domain samples (S_k) according to the equation,

$$V_i = \sum_{k=0}^{31} \cos\left((\pi/64)(i+16)(2k+1)\right) \times S_k$$

for $i = 0$ to 63, using the prestored cosine coefficients and the calculated cosine coefficients.

14. The method of claim 13, wherein 128 coefficients are prestored and 64 adjustment values are prestored.

15. The method of claim 13, wherein the time domain samples is from an MPEG compliant audio sub-band.

16. In a digital filter for sub-band synthesis, a method of performing an IDCT (Inverse Discrete Cosine Transform) process that generates time domain samples (V_i) from frequency domain samples (S_k) using prestored cosine coefficients, where i and k are integer values defining columns and rows respectively of a matrix of cosine coefficients, comprising the steps of:

prestoring the cosine coefficients $C(k, i)$ and $C(k-1, i)$ for each column of the matrix;

prestoring an adjustment value $\cos(E(i))$ for each column of the matrix; and

calculating the cosine coefficients for the remaining rows and columns of the matrix using the prestored coefficients and the prestored adjustment values in accordance with the equation,

$$C(k+1,i) = 2 \cos (E(i)) * C(k,i) - C(k-1,i).$$

17. The method of claim 16, further comprising the step of:

generating sixty-four samples (V_i) from thirty-two sub-band samples (S_k) according to the equation,

$$V_i = \sum_{k=0}^{31} \cos ((\pi/64)(i+16)(2k+1)) \times S_k$$

for $i = 0$ to 63 using the prestored cosine coefficients $C(k,i)$ and $C(k-1,i)$ and the cosine coefficients calculated using the adjustment value.

18. The method of claim 17, wherein the cosine coefficients for the next iterations are precalculated using the adjustment value in parallel with the calculation of the samples (V_i).

19. The method of claim 17, wherein a first group of the cosine coefficients and a second group of the cosine coefficients are calculated in parallel using separate processors.

20. The method of claim 19, wherein the first group of cosine coefficients is $\cos(k+2,i)$ for $k=0, 2, 4, \ldots 14$ and the second group of cosine coefficients is $\cos(k+2,i)$ for $k=1, 3, 5, \ldots 15$.

21. The method of claim 16, wherein the time domain samples is from an MPEG compliant audio sub-band.

22. The method of claim 16, wherein the number of prestored cosine coefficients is reduced by prestoring only two columns of the cosine coefficients and one column of the adjustment values cos(E) such that the size of the prestored matrix is 3x3 and the remaining cosine coefficients are calculated.

23. The method of claim 22, further comprising the step of:

generating sixty-four samples (V_i) from thirty-two sub-band samples (S_k) according to the equation,

$$V_i = \sum_{k=0}^{31} \cos\left((\pi/64)(i+16)(2k+1)\right) \times S_k$$

for i = 0 to 63 using the prestored cosine coefficients and the calculated cosine coefficients.

24. A digital filter for sub-band synthesis, comprising:

a memory for prestoring only the cosine coefficients that satisfy $\cos(\pi * (i/64))$ for i = 0 to 32; and

a processor, connected to the memory for receiving the prestored cosine coefficients, for performing an IDCT (Inverse Discrete Cosine Transform) process that generates time domain samples from frequency domain samples using the prestored cosine coefficients, wherein the processor calculates calculating cosine coefficients for i = 33 to 63 using the prestored coefficients by changing a sign of a corresponding symmetrical one of the prestored coefficients, respectively.

25. The digital filter of claim 24, further comprising:

means for generating sixty-four time domain samples (V_i) from thirty-two frequency domain samples (S_k) according to the equation

$$V_i = \sum_{k=0}^{31} \cos\left((\pi/64)(i+16)(2k+1)\right) \times S_k$$

for $i = 0$ to 63, using only the prestored cosine coefficients and the calculated cosine coefficients.

26. A digital filter for sub-band synthesis, comprising:

a memory for prestoring only the cosine coefficients that satisfy $\cos(\pi * (i/64))$ for $i = 0$ to 63; and

a processor, connected to the memory and receiving the prestored cosine coefficients, for performing an IDCT (Inverse Discrete Cosine Transform) process that generates time domain samples from frequency domain samples using the prestored cosine coefficients, wherein the processor generates sixty-four time domain samples (V_i) from thirty-two frequency domain samples (S_k) according to the equation

$$V_i = \sum_{k=0}^{31} \cos\left((\pi/64)(i+16)(2k+1)\right) \times S_k$$

for $i = 0$ to 63, using only the prestored cosine coefficients.

27. A digital filter for sub-band synthesis via an IDCT process that generates time domain samples (V_i) from frequency domain samples (S_k), where i and k are integer values defining columns and rows respectively of a matrix of cosine coefficients, the digital filter comprising:

a memory for prestoring the cosine coefficients $C(k-1,i)$ and $C(k-2,i)$ for each column of the matrix and an adjustment value cos(E) for each column of the matrix; and

a processor for calculating the cosine coefficients for the remaining locations in the matrix using the prestored coefficients and the prestored adjustment values in accordance with the equation

$$C(k,i) = 2 \cos (E(i)) * C(k-1,i) - C(k-2,i).$$

28. A digital filter for sub-band synthesis via an IDCT process that generates time domain samples (V_i) from frequency domain samples (S_k), where i and k are integer values defining columns and rows respectively of a matrix of cosine coefficients, the digital filter comprising:

a memory for prestoring the cosine coefficients $C(k)$ and $C(k-1,i)$ for each column of the matrix and an adjustment value $\cos(E(i))$ for column of the matrix; and

a processor for calculating the cosine coefficients for the remaining rows and columns of the matrix using the prestored coefficients and the prestored adjustment values in accordance with the equation,

$$C(k+1,i) = 2 \cos (E(i)) * C(k,i) - C(k-1,i).$$